REMARKS

This is in response to the Official Action of March 21, 2006, with one (1) month extension requested. This amendment is believed to positively respond to all objections now raised by the Examiner and place the case in condition for allowance.

The examiner is respectfully requested to telephone the undersigned if there are any questions.

The specification and abstract have been amended in a manner believed to overcome the Examiners objections with respect thereto.

Claim 114 has been amended to include language from former claim 115, which includes the limitation that "at least one of said spokes is pretensioned". As such, claim 115 has been cancelled. The feature of a pretensioned spoke serves to place the wheel in the "tension-spoke" category of wheel construction and to differentiate it from a wheel of "compression-spoke" construction. A tension-spoke wheel may be constructed as a much lighter structure, and with a greater load-bearing capacity, as compared to a compression-spoke wheel.

Claim 114 has been further amended to include language from claim 166 and to specify that "said deformed engagement is a longitudinal engagement along the longitudinal axis of said spoke". This longitudinal engagement serves to distribute the

contact stresses of the spoke-to-cavity connection over a broader engagement area to resist relative movement between the two and to support significantly higher loads. Further, the longitudinal engagement is especially applicable to wheels of a tension-spoke configuration as this arrangement is highly effective at anchoring the spoke to resist spoke tension forces.

The unique combination of features specified in the amended generic claim 114 is not taught by the references and serves to provide a vehicle wheel with several significant benefits as described in the specification of the present application.

Claims 166 and 169 have been amended to overcome the errors pointed out by the examiner in paragraph 6 of the action.

Claims 127-128, 170 and 176 have been amended to overcome the objections raised in paragraphs 9-12 of the action.

The main reference applied by the Examiner is Wilson. Applicant respectfully submits that generic claim 114 as amended is not at all taught or suggested by Wilson. Certainly also the dependent claims are not taught or suggested by Wilson.

Applicant respectfully submits that the significant combination of features claimed herein is not at all contemplated by Wilson, when Wilson is fairly read, particularly the combination including the newly added features.

Significantly, Applicant submits that Wilson is not a deformed connection and that his wheel is indeed a compression spoke wheel and not a tension spoke wheel, both as required in the instant claims. These significant distinctions will be discussed below.

<u>Wilson is not a deformed connection.</u>

During the time of the Wilson reference, it was a common construction technique to thread the spokes of a vehicle wheel directly into its hub flange. There are numerous references that can provide support for this. This common technology of the time employed a pre-threaded hole, into which the spoke was threadably fastened. This was the current state of the art of the day and there is no reason to think that Wilson would have employed a different system.

If Wilson had indeed contemplated a self-tapping or deformed connection, this would have been a sufficiently novel departure from current technology to warrant inclusion in the Wilson reference. But such a concept of a deformed connection is not discussed anywhere in the Wilson reference.

Wilson does mention that his hub flange does not have a "tendency to split" (page 1, line 88) in reference to its connection to the spokes. However, such a "tendency to split" could be caused by a wide range of forces that are experienced by a vehicle wheel during operation and does not indicate an interference fit between the spoke and the hub

flange. For example, deflection of the spoke due to lateral loads during operation of the wheel could induce the spoke to pry apart the hub flange. Or else, compressive loads on the spoke (loads that tend to drive the spoke deeper into the flange) during operation could serve to wedge or split the hub flange apart.

Wilson's alternative embodiment (Wilson's FIG. 5) utilizes a metallic or steel hub flange. Due to the high hardness of the steel flange, it would be impossible to create a deformed connection with a steel spoke of similar hardness. If Wilson had contemplated a deformed connection in his vulcanized fiber embodiment, the steel flange embodiment would be a significant departure in this regard. In his discussion of this alternative embodiment, Wilson makes no reference to a self-tapping or deformed connection, nor does he mention this as a factor in comparison with his preferred embodiment (Wilson's FIGS. 2-3).

Wilson is not a tension spoke wheel.

There is a significant difference between the requisite construction of a tension-spoke wheel and that of a compression-spoke wheel. In fact, these wheels are separated into two distinct categories in the Official U.S. Patent Classification. It should also be noted that the performance of a well-designed tension-spoke wheel is much higher than a compression-spoke wheel. As such, for a given load-carrying capacity, a tension-spoke wheel may be a far lighter weight structure than a compression-spoke wheel.

Indeed, it may be considered that a tension-spoke wheel is constructed to impart a pre-tension to the spokes such that, under normal use, the majority of the spokes remain in a tensioned and taught state. Spokes of tension-spoke wheels generally do not go into compression (except in unusual circumstances such as a radial impact or exceptionally high side load). In contrast, a compression-spoke wheel is constructed without any appreciable pre-tension, and under normal use, the spokes located between the hub and the ground will be compressed to support the axle load.

Wilson gives no indication that he contemplates the specific tension spoke wheel. Instead his construction clearly shows his wheel to be a compression-spoke wheel, rather than a tension-spoke wheel.

The following should be considered:

Wilson shows no means to pre-tension the spokes of his wheel. Indeed, there is no mention of spoke tension or of spoke pretension in the Wilson reference.

There is no head or swivel shown at the connection between the spoke and the rim. It is therefore reasonable to assume that the spoke may not be turned to adjust the threaded engagement between his spoke and his hub flange. In fact, even if such a swiveling means were provided, there is no means shown to effectively grip and rotate his spokes or to create a threaded adjustment to provide pre-tension to his spokes.

If the locknuts of his FIG. 2 were intended as a means to rotatably adjust this threaded connection, then these nuts would be spaced away from the hub flange to permit a range of adjustment. Instead, these locknuts are shown to be flush up against his hub flange and are therefore unequipped to provide such an adjustment.

Furthermore, in reference to these locknuts, Wilson states, "while locknuts are shown, they are not necessary". If these locknuts are merely optional, then this is further confirmation that the locknuts were not intended to be utilized to adjust spoke tension.

Since they are located outboard of the hub flange, Wilson's locknuts cannot provide resistance to spoke tension loads. In fact, his inclusion of these locknuts supports the fact that Wilson is indeed a compression-spoke wheel. The face of the locknut that is in contact with the hub flange is utilized to provide a broader surface area of contact to prevent the spoke from burrowing into the hub flange due to compressive loading of the spoke.

In addition, if Wilson intended that the effective span length of the spoke could be adjusted to provide spoke pretension, then a gap would need to be provided for a range of adjustment at the spoke's radially inboard end. Instead, there is no gap provided between the radially inboard end of Wilson's spoke and the threaded hole to which his spoke is engaged. This could only mean one of two things: (a) Wilson does not provide a pre-formed cavity for his spoke, but instead utilizes his spoke to pierce his hub flange and create its own cavity; or (b) Wilson's wheel is indeed a compression-spoke wheel and he

depends on the fact that his spoke is bottomed-out in its mating cavity to provide resistance to compressive loading of the spoke.

Further confirmation of the foregoing is provided in page 2, line 32 of the Wilson reference where he states, "while locknuts are shown, they are not necessary, as the screw holds well in the vulcanized fiber". Since the locknuts can provide only resistance to compressive loading of the spoke, this means that Wilson's spoke engagement serves to provide resistance to compressive loading of the spoke in the absence of these nuts. Furthermore, if these locknuts are merely optional, then this is further confirmation that the locknuts were not intended to be utilized to adjust spoke tension and that Wilson is a compression –spoke wheel.

In addition to the foregoing, it should be noted that, in tension-spoke wheel construction, the outer rim is placed in compression in the tangential (or hoop) direction due to the tension of the spokes. In fact, the rim of a tension-spoke wheel must be designed with a cross section stout enough to withstand buckling due to this hoop compression. Applicant notes that Wilson's rim is shown to be of generally thin and flat cross section, as shown in Wilson's FIG. 4, and does not have the bending stiffness to resist the requisite compressive loads and to effectively resist spoke tension. If Wilson was a tension-spoke wheel, his rim would tend to bulge outwardly in the regions between spoke anchor points, resulting a "clover leaf" outer perimeter, and creating in a wheel of questionable structural merit.

The slenderness of Wilson's spoke does not necessarily provide indication of a tension-spoke wheel. Since a relatively large number of spokes are employed in Wilson's design, the compressive loads are more highly distributed such that each spoke carries a smaller load. As such, Wilson's spokes are indeed capable of supporting the compressive loads. It is quite common, even in current times, to construct a compression-spoke wheel using relatively slender spokes. The wheels of the common garden cart are a good example, as are older baby carriage wheels, among others.

In view of the foregoing, it is courteously urged that Wilson does not at all teach or suggest the specifically defined features of the applicant's amended claims.

Claims 116 – 118 are rejected over Wilson in view of Lacombe. Applicant's claims define the specific combination of deformed engagement, longitudinal engagement and pretensioning. This combination of specifications is not believed to be shown in either of these references. Moreover, there is no suggestion for combining these references other than the applicant's disclosure.

Claims 122 and 135 are rejected over Wilson in view of Thompson. This combination of references is believed to be untenable. While the Thompson reference does show a hub flange of "plastic" material, his spoke holes (52) are aligned axially and are of a conventional design that is intended to be compatible with conventional spokes that include a j-bend and overlying head. This flange design is described in detail, and as prior art, in FIGS. 2a-c of the present application. Such a conventional spoke engagement

does not employ the longitudinal engagement feature of the present invention and therefore Thompson's spoke connection utilizes a singular focused engagement point with very high contact stresses. It should be noted that such a conventional spoke engagement is commonly used in industry in combination with hub flanges of steel or high-strength aluminum, materials that are much stronger than the plastic hub flanges utilized by Thompson. The high contact stresses of this conventional spoke connection commonly result in severe deformation of these steel and aluminum flanges. As such, Thompson's weaker plastic flange would not be able to support the spoke tension loads required in bicycle wheel construction. Indeed, it is believed that no such plastic hub has never been successfully commercialized. On the other hand, the longitudinal engagement utilized in the present invention serves to distribute these stresses over a larger region, which reduce these stresses significantly. As discussed in paragraph [0089] of the present application, "It is this reduction of contact stress that permits softer and weaker hub flange 16 materials, such as polymeric materials, to be employed in such a hub flange application. As opposed to most metals, polymeric materials exhibit a relatively high level of creep when subjected to elevated stress levels. Thus, this longitudinal engagement reduces this stress and is particularly applicable to hub flanges of polymer construction. Heretofore, a longitudinal spoke engagement has not been applied in a polymer hub flange design and polymeric materials have never been successfully applied to hub flange applications, particularly in a tension spoke wheel assembly."

Moreover, there is no suggestion for combining these references other than the applicant's disclosure.

Claims 169 – 171 are rejected over Wilson in view of Watson. This rejection is believed to be untenable. The Watson reference does show a single crossover region of two spokes that is within the perimeter of his hub flange. This merely shows the single anchor points of his spokes (at the spoke heads) to be arranged so that their spans cross past each other within the perimeter of his hub flange. It should be noted that this is not particularly novel and that most tangentially-laced wheels employ a similar design, but locate these crossover points outside the perimeter of the hub flange.

Watson does not at all contemplate a longitudinal engagement and therefore his span regions of crossover do not reinforce the hub flange, nor do they augment their connection with the crossover spokes. However, the present invention does indeed utilize such a longitudinal engagement. As described in paragraph [0085] of the present application, "This longitudinal engagement distributes the spoke tension loads and the associated stresses over a longitudinal length, rather than focusing these loads at a small point of contact as with conventional prior art wheel assemblies." And as described in paragraph [0110], "With a longitudinal engagement region, as described previously, the spoke may serve to support and reinforce the hub flange material along the length of this engagement region. Further, if a given spoke crosses two or more spokes within the hub flange 16 material, the spoke then serves as a strengthening bridge to reinforce the hub flange 16 material between these two other crossing spokes."

Moreover, there is no suggestion for combining these references other than in the applicant's disclosure.

With respect to the examiner's obviousness-type double patenting rejection, applicant is submitting herewith a terminal disclaimer.

Thus, in view of the amendments presented herein and the foregoing detailed discussion, Applicant courteously submits that all claims define patentably over the references. Favorable consideration is solicited.

Respectfully submitted,

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